



Final Recommended Plan / Final Environmental Impact Report

Town of Mashpee Sewer Commission



May 2015



CLIENTS | PEOPLE | PERFORMANCE

June 10, 2015

Mr. Matthew A. Beaton, Secretary
Executive Office of Energy & Environmental Affairs
Attention: MEPA Office
EEA# 12615
100 Cambridge Street Suite 900
Boston, MA 02114

RE: Comprehensive Watershed Nitrogen Management Plan, Town of Mashpee
GHD File No.: 8612001

Dear Mr. Beaton:

On behalf of the Mashpee Sewer Commission, we are pleased to submit the enclosed Final Recommended Plan/Final Environmental Impact Report for the above referenced project. This is the fourth of four submittals prepared and submitted for MEPA review. This project culminates in the Final Recommended Plan and Environmental Impact Report for the project planning area as part of the Comprehensive Wastewater Management Planning (CWMP) process.

The Mashpee Sewer Commission has continued to work hard to develop this document, the approach to identify alternatives, and a Recommended Plan that is key to the environmental and economic sustainability of project planning area. We have consulted with the Massachusetts Department of Environmental Protection, Department of Energy Resources, Division of Marine Fisheries, the Cape Cod Commission and Joint Base Cape Cod/MassDevelopment among other agencies and entities in development of this plan. This document also addresses the various issues raised in the most recent Secretary's Certificate issued September 12, 2014 regarding the project.

Please find enclosed two (2) hard copies and one PDF file on CD of the above referenced document. We look forward to the MEPA review of this document so we can proceed with implementation.

If you have any questions, please contact Thomas Fudala, Mashpee Sewer Commission Chair at 508-539-1400 x 8521 or tfudala@mashpeema.gov or J. Jefferson Gregg, P.E., BCEE, GHD Project Manager at 774-470-1640 or jeff.gregg@ghd.com.

Sincerely,

GHD Inc.

J. Jefferson Gregg, P.E., BCEE
Project Manager

Enclosure

cc: All individuals on Distribution List

GHD Inc.

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DISTRIBUTION LIST – MASHPEE COMPREHENSIVE WATERSHED NITROGEN MANAGEMENT PLAN – FINAL RECOMMENDED PLAN/FINAL ENVIRONMENTAL IMPACT REPORT SUBMITTAL

| | |
|--|--|
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| MassDEP - Cape Cod Office (HC) Brian Dudley 3195 Main Street Barnstable MA 02630 | MassDEP - SERO (HC) 20 Riverside Drive Lakeville, MA 02347 |
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| David Mason, Health Agent (CD) Town of Sandwich 16 Jan Sebastian Drive Sandwich, MA 02563 | Gerald Potamis, P.E. (HC & CD) Wastewater Superintendent 59 Town Hall Square Falmouth, MA 02540 |
| Lindsey Counsell (CD) Three Bays Preservation P.O. Box 215 Osterville, Ma 02655 | Lombardo Associates Inc. (CD) 188 Church Street Newton, MA 02458 |
| Mashpee Wampanoag Indian Tribal Council (CD) P.O. Box 1048 Mashpee, MA 02649 | Michael Ciaranca (CD) Environmental & Readiness Center Building 1204 West Inner Road Camp Edwards, MA 02542 |
| Natural Resources Department (CD) Mashpee Wampanoag Tribe 483 Great Neck Road South Mashpee, MA 02649 | Thomas O'Neill (CD) Mashpee Chamber of Commerce P.O. Box 625 Mashpee, MA 02649 |
| Association to Preserve Cape Cod (CD) Edward J. DeWitt 3010 Main Street P.O. Box 398 Barnstable, MA 02630-0398 | |

HC = Hard Copy CD = Compact Disc

FINAL RECOMMENDED PLAN / FINAL ENVIRONMENTAL IMPACT REPORT

Prepared for

TOWN OF MASHPEE SEWER COMMISSION

Prepared by

GHD INC.

1545 IYANNOUGH ROAD

HYANNIS, MASSACHUSETTS 02601-1840

MAY 2015



Executive Summary

Preamble

In June of 2014 the Draft Recommended Plan and Draft Environmental Impact Report (DRP/DEIR) was submitted as the third of four reports as part of the Town of Mashpee's Comprehensive Planning Process. It presented the recommendations of this planning process to address the nitrogen Total Maximum Daily Loads (TMDLs) established for Popponesset Bay and Waquoit Bay's eastern basin; it discussed the mitigation measures and implementation approach for Mashpee (and its neighboring communities within the project planning area) to address the needs as identified in previous documents.

The Comprehensive Wastewater Management Plan (CWMP) is the culmination of multiple documents, the last of which is the Final Recommended Plan and Final Environmental Impact Report (FRP/FEIR or The Plan). This report is the last of four documents required as part of the Massachusetts Environmental Policy Act (MEPA)/Cape Cod Commission (CCC) Development of Regional Impact (DRI) joint review process.

The Plan is the result of over 15 years of effort in examining Mashpee's needs and coordinating with the efforts of the Massachusetts Estuaries Project (MEP) and, most recently, the Cape Cod Commission's 208 Planning efforts. This has resulted in a 25-plus year implementation schedule allowing mid-course corrections to occur as part of the Adaptive Management part of the process. The Project Planning Area (PPA) includes all of Mashpee and portions of the neighboring communities of Barnstable, Falmouth and Sandwich that fall within the Popponesset Bay watersheds or eastern Waquoit Bay watersheds.

The plan is predicated on the use of shellfish in the following areas: Popponesset Bay/ Popponesset Creek, Ockway Bay, Mashpee River and Shoestring Bay on the Popponesset Bay watersheds side and in Hamblin Pond, Little River, Jehu Pond and Great River on the Waquoit Bay side. Removal of the remaining balance of nitrogen will rely on a combination of traditional infrastructure (sewers), stormwater improvements through current best management practices (BMPs) and fertilizer reduction through the new bylaws/regulations in Mashpee and Falmouth.

The traditional infrastructure is primarily focused in the Mashpee River watershed in Phase 1 with a shift to include the Quashnet/Moonakis River watershed in Phase 2. The efforts in the Quashnet/Moonakis watershed will depend on the findings of the proposed "soft solution" flushing analysis for the Moonakis River and, ultimately, the availability of Joint Base Cape Cod (JBCC) for a regional treatment solution.

Monitoring and additional modeling are proposed for tracking performance throughout the 20-30 year planning period. The Adaptive Management Plan is backed by a "Plan B" option to consider full traditional infrastructure in the needed areas at build-out if increased future loads or lesser performance of the adaptive approaches are seen over the planning period. TMDL compliance/MEP modeling points will be used to track performance and allow for mid-course corrections through adaptive management.

The estimated capital cost for Phase 1 is approximately \$34 million, and, depending on shellfish performance and adaptive management, TMDL compliance is estimated between \$220 and \$360 million.



ES.1 Background

The purpose of the Final Recommended Plan and Final Environmental Impact Report (FRP/FEIR) is to present the recommendations of this planning process to address the nitrogen Total Maximum Daily Loads (TMDLs) established for Popponesset Bay and Waquoit Bay's eastern basin, and to discuss the mitigation measures and implementation approach for Mashpee (and its neighboring communities within the project planning area) to address these needs as identified in previous documents. These recommendations as they relate to Mashpee will then be managed through the Mashpee Water and Sewer District and the Town of Mashpee.

The Town of Mashpee initiated the process to develop a Watershed Nitrogen Management Plan (WNMP) in 1999 in order to address the nitrogen impacts to coastal embayments and to evaluate options for restoring those embayments through the development of a Comprehensive Wastewater Management Plan (CWMP). Because the contributing areas to the estuaries (watersheds) are shared by multiple towns, Mashpee's WNMP Project Planning Area (PPA) includes the Town of Mashpee and the portions of neighboring towns (Barnstable, Falmouth, and Sandwich) that fall within the Popponesset Bay and Waquoit Bay East Basin watersheds. The PPA is illustrated in Figure ES-1. The WNMP/CWMP is intended to provide an environmentally and economically sound plan for nitrogen reduction, wastewater treatment, and treated water recharge in the planning area.

As stated previously, the CWMP is the culmination of multiple documents generated during the planning process.

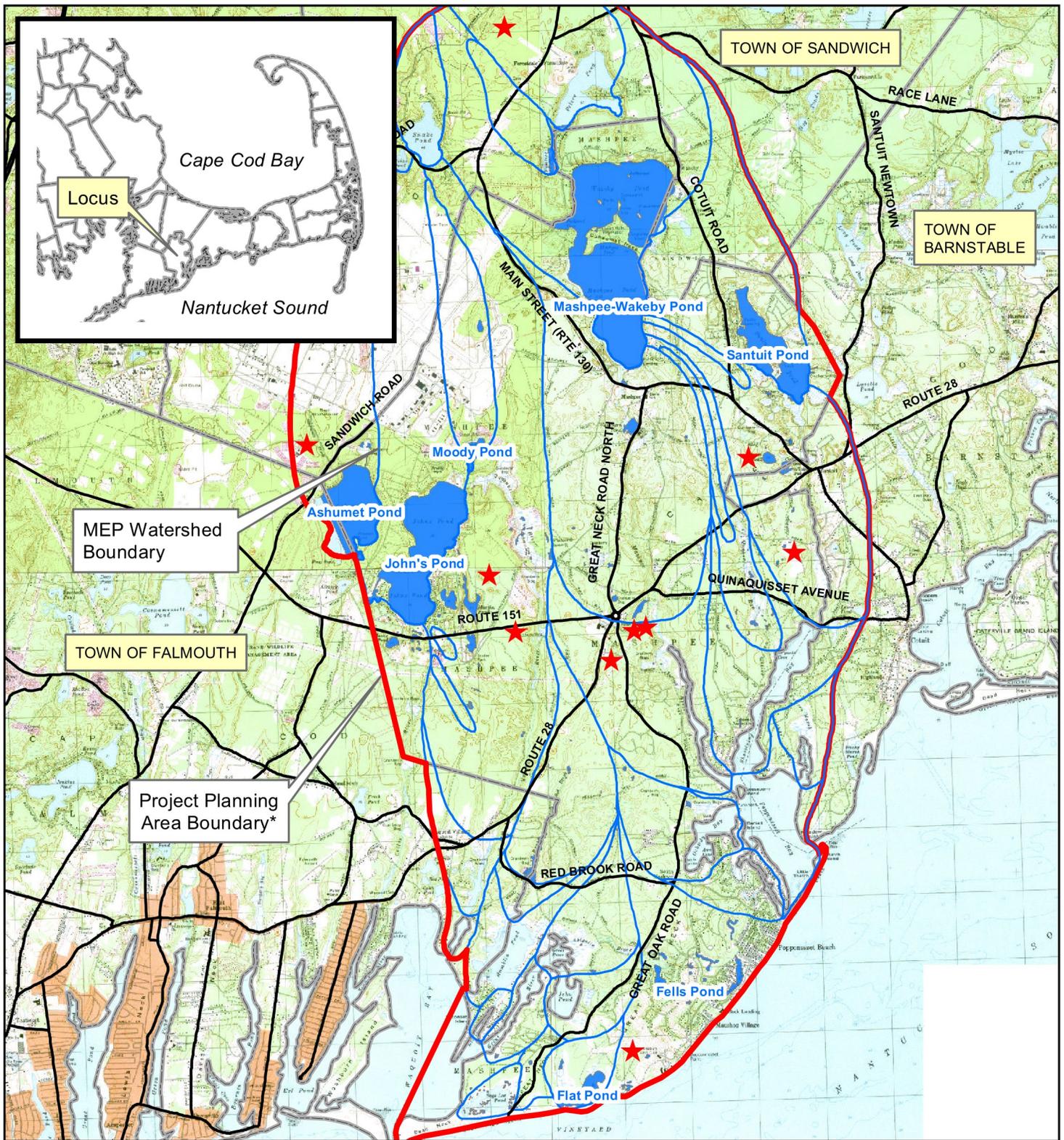
ES.2 MEPA Planning Documents

In September of 2001, the Town of Mashpee, through the Mashpee Sewer Commission, entered into the MEPA process by filing their Environmental Notification Form (ENF) and MEPA Unit/Cape Cod Commission Joint Review Process Application Form. That document identified several major deliverables to be submitted for review through this process in addition to the Notice of Project Change submittals required due to the extended nature of this project.

Those deliverables, which have been submitted, included:

1. **Needs Assessment Report (NAR)**—issued in April 2007
2. **Technology Screening Report**—issued in November 2007
3. **Draft Alternative Scenarios Analysis and Site Evaluation Report**—issued in March 2008
4. **Two (2) Notices of Project Change** (in 2007 and 2012)
5. **Alternatives Screening Analysis Report (ASAR)**—issued in August 2013
6. **Draft Recommended Plan/Draft Environmental Impact Report (DRP/DEIR)**—issued in June 2014

Following the submittal of the DRP/DEIR, MEPA issued their most recent certificate dated September 12, 2014, a copy of which is included in Appendix 1-1. That Appendix also includes the most recent response to comments.



LEGEND

- MEP Watershed
- ★ WWTF Location
- Major Roadway (For Location Reference)

***The Project Area is the combination of the entire Town of Mashpee and the watersheds of Popponesset Bay and Waquoit Bay-East as delineated by the Massachusetts Estuaries Project (MEP) extending into the Towns of Barnstable, Falmouth and Sandwich.**

Paper Size ANSI A



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
 Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001



Town of Mashpee Sewer Commission
 Watershed Nitrogen Management Plan

Job Number | 86-12001
 Revision | A
 Date | 07 May 2015

PROJECT PLANNING AREA

Figure ES-1



ES.3 Public Participation

The Mashpee Sewer Commission has actively engaged in public participation throughout the planning process, with a focus on educating the public on the issues of wastewater and nutrients as they relate to the watersheds of Popponesset Bay and Waquoit Bay's east basin, as well as the remaining portions of Mashpee within the Project Planning Area. The Commission has actively encouraged residents, Town leaders, business leaders, regulators, and adjacent communities within and outside of the planning area to actively participate in the planning process. The public outreach program consists of several components, including:

- ∞ Monthly Sewer Commission meetings—televised and open to the public.
- ∞ A Community Advisory Committee (CAC)—as appointed by the Board of Selectmen.
- ∞ Public presentations on various phases and aspects of the project and related efforts through the Town and Region.
- ∞ Development of public education materials:
 - Project web page: www.mashpeewaters.com, including project description, meeting minutes, reports, contacts, and other project related information.
 - Project kiosk; focusing on the problem and where to get additional information.
 - Informational flier (first of two): the first focused on the nitrogen issues facing the PPA and general information on the project. The second will be coordinated with the submittal of the Final Recommended Plan.
- ∞ Participation in a formal MEPA/CCC environmental review process.
- ∞ Participation in several “Pilot” projects supported by Barnstable County and other regional agencies.
- ∞ Joint meetings with Barnstable, Falmouth, and Sandwich to review the project and the efforts being made by all parties to address nitrogen in these watersheds and throughout the region.
- ∞ Participation in the Cape Cod Commission 208 Planning process.

ES.4 Summary of Previous Evaluations

Throughout the planning process the CWMP has evaluated several alternatives/options and has performed additional related evaluations in the process of developing a Recommended Plan.

Following the release of the Needs Assessment Report, the Mashpee Sewer Commission identified five different management scenarios for evaluation and analysis. The 2008 Draft Alternative Scenarios Report discusses the general characteristics of each scenario and the basic methodology used to evaluate each scenario.

The five scenarios identified were:

- ∞ Scenario 1—No expansion of existing wastewater treatment facilities.
- ∞ Scenario 2—Upgrade and expansion of existing facilities to a practical extent.
- ∞ Scenario 3/3R—Cluster Scenario (prepared by Lombardo Associates Inc.).



- ∞ Scenario 4—Fair Share reduction.
- ∞ Scenario 5—Centralized treatment approach.

Each of these scenarios was modeled through the Massachusetts Estuaries Project (MEP) program for both Popponesset Bay and Waquoit Bay East. The findings were used in the development of Options 1A, 1B, and 1C as outlined in the 2012 Technical Memorandum presenting these options for addressing nitrogen in the watersheds. The ultimate goal of these new options was to advance the development of a Recommended Plan for nitrogen management within the PPA. Each option was modeled by the MEP to demonstrate feasibility to meet the TMDLs. The results of these model runs were formally presented in the Final ASAR.

The 2013 ASAR summarized the planning efforts performed to date, the model results and findings for the three proposed Options (1A, 1B, and 1C), and the technologies screened (as part of the 2007 Technology Screening Report). This document also summarized the framework for the Recommended Plan and identified the general categories of nitrogen removal that would be used to form the basis of the Recommended Plan.

The ASAR identified these main categories to address nitrogen removal:

- ∞ Source Removal.
- ∞ Direct Environmental Mitigation.
- ∞ Land Management Strategies.

Using these categories the ASAR outlined a framework for the development of the Recommended Plan.

The 2014 Draft Recommended Plan built upon this effort and evaluated alternatives to the Option 1A plan, including:

- ∞ Centralized vs. new cluster area treatment facilities
- ∞ Regional Solutions
- ∞ Existing Wastewater Treatment Facilities (WWTFs)
- ∞ Traditional vs. Hybrid Solutions
 - Primarily:
 - Shellfish Aquaculture
 - Secondarily:
 - Permeable Reactive Barrier (PRB)
 - Bog and Wetland Restoration
 - Onsite systems

The evaluations and draft recommended plan are included in Chapters 4 and 5 of this report.



ES.5 Summary of Recommended Plan

The efforts of the Draft Plan and comments from the various regulators and reviewers resulted in the Final Recommended Plan as outlined below. Chapter 6 provides additional detail of this Plan, and Chapter 9 outlines the proposed implementation schedule.

The following summarizes the major components of the Recommended Plan.

1. Shellfish Aquaculture:

Table ES-1 Shellfish Plan for Nitrogen Removal

| Area | Nitrogen Removal ⁽¹⁾ Required (MEP) Metric Tons (MT) N/year | Removal by Shellfish MT N/year | Shellfish Harvest MT Live/year | Number of Shellfish Million/Species |
|---|--|--------------------------------|--------------------------------|-------------------------------------|
| SC19 + SC20 (Shellfish Resource Areas) | | | | |
| Popponesset Bay/Creek | 1.46 | 1.46 | 292 | 4.87/quahogs ⁽²⁾ |
| Ockway Bay | 0.87 | 0.87 | 174 | 2.45/quahogs ⁽²⁾ |
| Mashpee River | 5.01 | 2.5 | 500 | 5.00/oysters ⁽³⁾ |
| Shoestring Bay | 4.03 | 2.00 | 400 | 4.00/oysters ⁽³⁾ |
| Total | 11.37 | 6.83 | 1,366 | 16.32 |
| SC16 (Shellfish Resource Areas) | | | | |
| Hamblin Pond | 3.41 | 3.41 | 682 | 11.37/quahogs ⁽²⁾ |
| Little River | 0.32 | 0.32 | 64 | 1.07/quahogs ⁽²⁾ |
| Jehu Pond | 1.05 | 1.05 | 210 | 3.50/quahogs ⁽²⁾ |
| Great River | 0.98 | 0.98 | 196 | 3.27/quahogs ⁽²⁾ |
| Total | 5.76 | 5.76 | 1,152 | 19.21 |
| Total SC16, 19 + 20 | 17.13 | 12.59 | 2,518 | 35.53 |

Notes:

1. Nitrogen removal required calculated from: MEP Report, Howes et al. 2004. Table ES-2 page ES 10
2. Littleneck quahogs @ 60 g. N
3. Oysters @ 100 g



2. Wastewater Treatment at Joint Base Cape Cod (JBCC):
 - a. Potential expansion:
 - i. Mashpee Subareas H (including High School), L, and M.
 - ii. Sandwich Subareas Sand-1, -2, and -3.
 - iii. No change to open sand beds.
 - iv. Future consideration (potential WWTF additional expansion):
 - a) Falmouth areas Fal-13 to Fal-17 (potentially to be recharged outside watershed).
 - b) No change to open sand beds.
 - b. Expansion of the existing Carrousel® WWTF to add another parallel train of equal size and an additional second clarifier.
3. Wastewater Treatment at Proposed New Facilities:
 - a. Site 4 to serve Subareas: F, S1, S2, and T:
 - i. Phased to pick up portions of S adjacent to Falmouth Road first.
 - ii. Recharge at Site 4.
 - iii. Fallback recharge area at Willowbend Golf Course.
 - iv. Treatment performance dependent on recharge location
 - b. Back Road Site as a backup to JBCC (see 2)
 - i. Sand-1, Sand-2, and Sand-3 would need to be addressed in their watersheds and recharged outside the watershed, or possibly connect to a regional facility at Back Road.
 - c. Site 6 to serve Subareas identified under shellfish propagation (except Subarea B):
 - i. Later year project as shellfish performance is monitored.
4. Wastewater Treatment at Existing WWTFs with Improvements/Expansions/Modifications:
 - a. New Seabury—expand recharge capacity, potential future expansion of Subarea B (as fallback to shellfish):
 - i. Potential expanded recharge capacity from other treatment locations (Mashpee Commons, Windchime Point and Site 6) drip irrigation in addition to existing recharge capacity at Site 7 and golf course areas.
 - ii. No initial expansion needed until new facilities are constructed at Site 6 or modeling shows shellfish program will not meet TMDLs with continued recharge from Mashpee Commons and Windchime Point.
 - b. Willowbend—expand recharge capacity, as fallback for Site 4 WWTF, improved future performance to 3 mg/L TN:
 - i. Potential expanded recharge capacity (drip irrigation).
 - ii. Potential extension of service to pick up Subarea I.
 - iii. Evaluate performance needs in conjunction with shellfish results.
 - c. Mashpee Commons:
 - i. Potential expansion to Subarea P (and N as required).
 - ii. Recharge locally under shellfish program.



ES.5.1 Cost Summary

Table ES-2 Estimated Total Capital Cost of Entire Recommended Plan With and Without Shellfish at Build-out ^(1, 2, 6)

| Estimated Capital Costs | Recommended Plan with Shellfish Aquaculture | Recommended Plan without Shellfish Aquaculture |
|--|--|---|
| Town of Mashpee Estimate | | |
| Shellfish Aquaculture (yr 1) ⁽⁷⁾ | \$1,300,000 | \$0 |
| Collection System | \$120,000,000 | \$170,000,000 |
| Treatment System ⁽⁵⁾ | \$32,000,000 | \$66,000,000 |
| Recharge Facility | \$5,400,000 | \$13,000,000 |
| Mashpee Total | \$160,000,000 | \$250,000,000 |
| Neighboring Towns Estimate (Barnstable, Falmouth, Sandwich)⁷ | | |
| Shellfish Aquaculture (yr 1) ⁽⁷⁾ | \$200,000 | \$0 |
| Collection System | \$53,000,000 | \$ 80,000,000 |
| Treatment System ^(3, 4, 5) | \$8,700,000 | \$ 23,000,000 |
| Recharge Facility ^(3, 4) | \$300,000 | \$ 2,000,000 |
| Neighboring Town Total | \$62,000,000 | \$110,000,000 |
| Total | \$220,000,000 | \$ 360,000,000 |

Notes:

1. Values are rounded to two significant figures and include allowances for fiscal, legal and engineering services, and contingency.
2. Values are based on an ENR index year of 2017 and are based on future flow conditions and TMDL compliance.
3. Treatment costs include new facilities and improvements/upgrades to existing facilities, including allowances for facilities located in Sandwich (not including those proposed to connect to JBCC), and Barnstable (Falmouth assumed to go to JBCC).
4. For neighboring communities of Barnstable, Falmouth, and Sandwich, collection, treatment, and recharge costs were estimated for planning purposes only; actual location, technology type, and site considerations would need to be determined by each individual community.
5. Estimated costs with shellfish aquaculture presume that existing and future loads are managed through this adaptive management approach; that Joint Base Cape Cod is available, and no additional recharge capacity is required at JBCC.
6. Does not consider increasing shellfish aquaculture areas to reduce sewerage if shellfish performance is as good as or better than projected.
7. Includes potential cost sharing of shellfish aquaculture projects.



Table ES-3 Estimated Total Present Worth Cost of Recommended Plan at Build-out ⁽¹⁾

| Operation and Maintenance Costs | TMDL Compliance with Shellfish Aquaculture | TMDL Compliance without Shellfish Aquaculture |
|--|---|--|
| Town of Mashpee Estimate | | |
| Shellfish Aquaculture ⁽⁷⁾ | \$1,300,000 | \$0 |
| Collection System | \$540,000 | \$1,000,000 |
| Treatment System ⁽²⁾ | \$3,100,000 | \$4,600,000 |
| Recharge Facility ⁽²⁾ | \$530,000 | \$1,200,000 |
| Mashpee Total | \$5,500,000 | \$6,800,000 |
| Neighboring Towns Estimate (Barnstable, Falmouth, Sandwich)⁸ | | |
| Shellfish Aquaculture ⁽⁷⁾ | \$200,000 | \$0 |
| Collection System | \$350,000 | \$500,000 |
| Treatment System ⁽³⁾ | \$660,000 | \$1,600,000 |
| Recharge Facilities ⁽³⁾ | \$4,000 | \$21,000 |
| Neighboring Town Total | \$1,200,000 | \$2,000,000 |
| O&M Annual Total ⁽⁵⁾ | \$6,700,000 | \$ 8,900,000 |
| Present Worth O&M | \$100,000,000 | \$140,000,000 |
| Total Capital Cost (Table 6-11) ⁽⁶⁾ | \$220,000,000 | \$360,000,000 |
| Total Present Worth | \$320,000,000 | \$500,000,000 |

1. Values are rounded to two significant figures, and include allowances for fiscal, legal and engineering services, and contingency.
2. Treatment O&M costs include new facilities and improvements/upgrades to existing facilities.
3. Neighboring communities of Barnstable, Falmouth, and Sandwich collection, treatment, and recharge O&M costs were estimated for planning purposes only; actual location, technology type, and site considerations would need to be determined by each individual community.
4. Estimated annual costs with shellfish aquaculture presume that existing and future loads are managed through this adaptive management approach; that Joint Base Cape Cod is available, and no additional recharge capacity is required at JBCC.
5. Costs do not include existing O&M at Joint Base Cape Cod associated with those facilities' existing operations.
6. Total capital costs are based on an ENR index year of 2017.
7. Cost does not include Town staff which is currently funded by the Town through their existing program.
8. Includes potential cost sharing of shellfish aquaculture projects.



ES.6 Adaptive Management Plan

Following the submittal of the final CWMP, the Sewer Commission/Town and District will work to formalize the Adaptive Management Plan.

These efforts would include those non-traditional methods discussed in Chapter 4 and Chapter 6. The following were specifically identified in the Recommended Plan (Chapter 6):

- ∞ Shellfish Propagation (key aspect of Recommended Plan)
- ∞ Stormwater Mitigation
- ∞ Fertilizer Management

The following are other technologies and approaches discussed in the planning effort that may be considered through adaptive management. This list includes but is not limited to the following:

- ∞ Demonstration Projects:
 - Permeable Reactive Barriers
 - Wetland Restoration
 - Eco Toilets
- ∞ Land Management
- ∞ Floating Wetlands
- ∞ Ocean Outfall
- ∞ CCC 208 Plan technologies as appropriate

The plan will also cover both the short- and long-term monitoring and modeling required to set decision points on performance of the recommended plan and timing.

As the plan is currently crafted, existing infrastructure will be utilized to its fullest extent, while several small “Phase 1” projects requiring extension of sewers in areas within the Mashpee River watershed are proposed in addition to shellfish aquaculture.

As the monitoring and modeling demonstrates performance (especially as it relates to shellfish aquaculture), adjustments in additional shellfish, other nitrogen removal measures, or advancement/ delay in sewer extensions will be implemented as needed to address nitrogen removal performance. This will be done with consideration of future development within the watersheds, shellfish health, and advancement of other mitigation approaches allowing the Town to make mid-course adjustments to their implementation approach; changes will be documented through Notices of Project Change.

ES.6.1 Monitoring and Modeling

It is understood that ongoing and proposed environmental monitoring activities may indicate environmental changes, and mid-course corrections to the plan implementation may be necessary. This understanding of possible mid-course corrections is often referred to as “Adaptive Management”. The following components of the compliance monitoring of this plan are identified. It is understood that as time progresses the plan will need to be adjusted to account for changes in permitting requirements and to take into consideration the changes in the environment.

Initial/Short-Term Monitoring and Modeling

- ∞ Shellfish/estuary baseline monitoring.



- ∞ Estuary short-term (ongoing) intensive water quality and shellfish quality monitoring to check near-term performance following MEP established protocols for estuary water quality and health.
- ∞ MEP flushing and stream gauge monitoring necessary to update MEP TMDL compliance points.
- ∞ Groundwater/drinking water supply quality.
- ∞ Groundwater mounding analysis through localized modeling.

Long Term Monitoring and Modeling

- ∞ Each of the existing and proposed treatment facilities that have MassDEP groundwater discharge permits have various monitoring requirements (including but not limited to):
 - Daily monitoring of flow, pH, disinfection, and turbidity.
 - Weekly/monthly monitoring of flow, biochemical oxygen demand (BOD), total suspended solids (TSS), total nitrogen (TN), and possibly total phosphorus (TP).
 - Groundwater monitoring well data (typically quarterly); upgradient and down gradient of recharge facilities.
- ∞ MEP estuary monitoring and modeling (land and hydrodynamic):
 - TMDL Compliance.
 - Long-term trending of standard MEP water quality parameters.
 - Eel grass surveys typically provided by MassDEP.
 - Benthic habitat surveys (if required).
- ∞ Shellfish/Estuary Monitoring:
 - Long-term compliance monitoring performed following the same MEP protocols to measure estuary health.
 - Shellfish monitoring in compliance with Division of Marine Fisheries (DMF) requirements depending on end use of shellfish.
 - Sample analysis including shellfish physical characteristics (length, weight, etc.) and nitrogen content
- ∞ Groundwater quality monitoring through existing drinking water supply wells (as required by MassDEP and Environmental Protection Agency), and groundwater monitoring wells (as required by groundwater discharge permits issued by MassDEP for wastewater treatment facilities).

A more extensive list is provided in Chapter 10.

ES.6.2 Compliance Reporting

As part of the implementation of the plan, each implementation phase will be incorporated into a compliance document related to Mashpee's efforts in achieving the TMDLs. Depending on the requirements established by the regulators, this document may need to reference or be referenced by the neighboring communities as part of their compliance reporting. This document, which will need to be negotiated with the Town, District, and associated regulators, would then be available to MassDEP, DMF, Coastal Zone Management (CZM), MEP, CCC, neighboring communities, and other agencies as so identified in that effort.



This report is anticipated to be tied directly to the monitoring efforts and “modeling” plan necessary to demonstrate compliance with the TMDLs and performance of those efforts implemented to date. Due to the long-term nature of the implementation, it is anticipated that this document would be prepared and issued every five years, similar to the MassDEP groundwater discharge permit program.

ES.6.3 Regional Coordination

As discussed previously, planning efforts of the neighboring communities for TMDL compliance and other water quality (fresh, salt, ground) are expected to have positive impacts on the estuary water quality; as a result, Towns need to be able to make mid-course adjustments in their implementation related to these impacts.

ES.7 Implementation Schedule

A preliminary implementation schedule is presented in this report, focusing on five (5) year increments following the initial short-term period surrounding the completion of the Final CWMP.

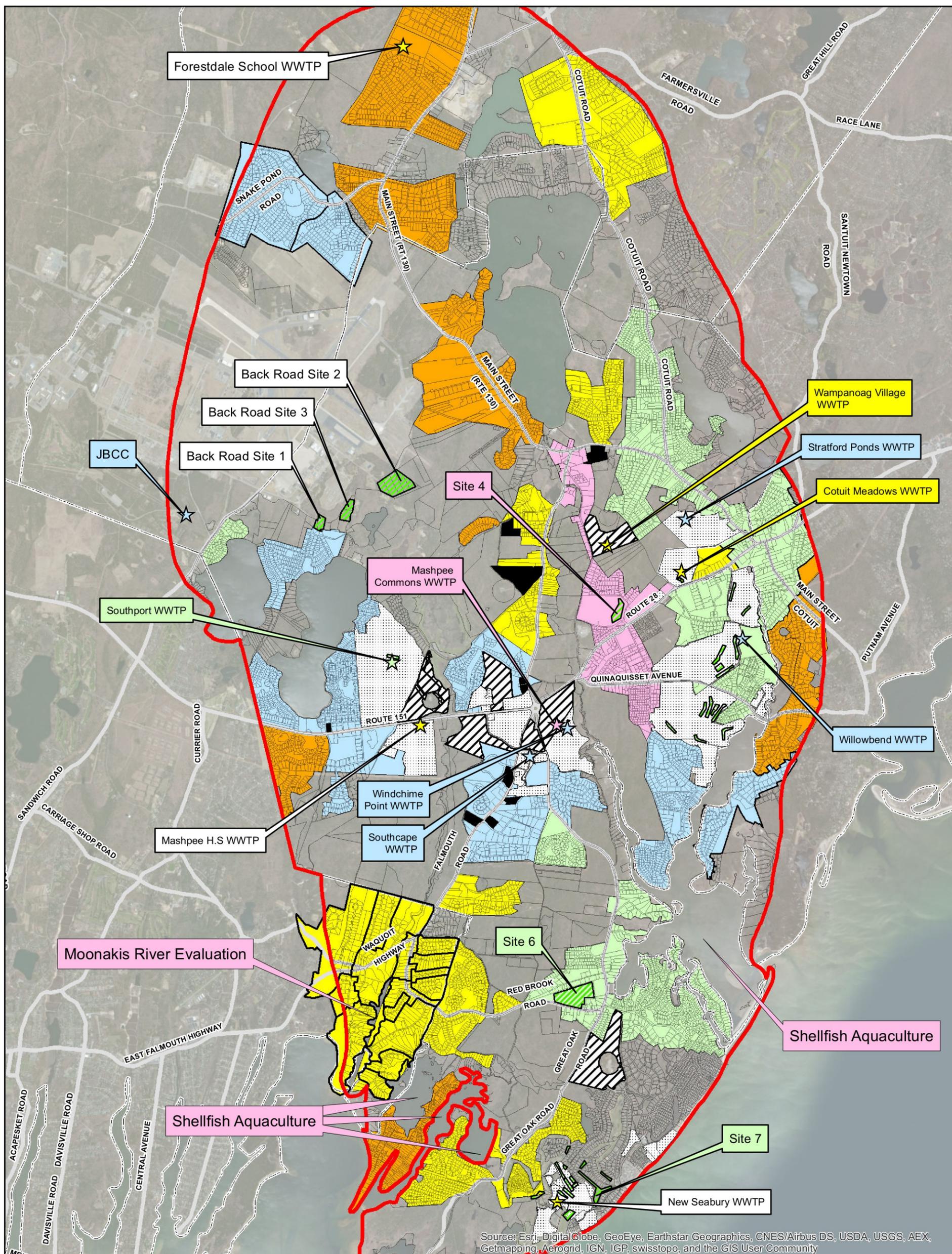
Shellfish aquaculture is targeted for early implementation because the Town is actively maintaining and pursuing expansion of shellfish aquaculture within Popponesset Bay (namely Mashpee River) in collaboration with the Wampanoag Tribe, MEP, and others. Additional initiatives and grant incentive programs are being pursued to expand this program; therefore this is the first part of the Recommended Plan’s implementation. The shellfish program will work to fast-track the water quality improvement needed in the waterbodies as it relates to nitrogen impacts.

At the same time, efforts related to Ownership of several existing wastewater treatment facilities within the PPA and to the potential opportunity to work with MassDevelopment and Joint Base Cape Cod on a regional facility are critical ongoing tasks regarding implementation.

The following is a summary of the schedule (as shown in Figure ES-2).

2015-2016

- ∞ MEPA/DRI approval.
- ∞ Possible establishment of Mashpee Water and Sewer District. {Legislation passed April 14, 2014 – awaiting subsequent action – Spring 2015 Election}.
- ∞ MOU between the Mashpee Water and Sewer District and the Town of Mashpee (if needed), or creation/organization of Town departments for implementation and oversight.
- ∞ Shellfish Propagation (Current/Existing Program).
- ∞ WWTF Ownership Discussions
 - Joint Base Cape Cod/MassDevelopment
 - Private Facilities
 - New Seabury
 - Willowbend
 - Mashpee Commons
 - Southport
 - Stratford Ponds



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

- I/A
- Planning Area Boundary
- Parcel Boundary
- Wastewater WWTP (Color per Phase)
- Existing Private Sewer
- Proposed Private Sewer
- Proposed Treatment/Discharge Site
- Implementation Phase**
- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Phase 5

Paper Size ANSI B



TOWN OF MASHPEE SEWER COMMISSION
Watershed Nitrogen Management Plan

Job Number | 86-12001
Revision | A
Date | 07 May 2015

Implementation Phasing Plan

Figure ES-2

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet

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- ∞ Continue development of Regional Memorandums of Understanding (this will also influence long-term implementation of areas within the neighboring communities).
- ∞ Fertilizer management bylaw implementation.
- ∞ Continued use of stormwater BMPs.

The following Phases 1 through 5 (divided into 5-year increments) are depicted in Figure ES-2 and were included in various phases based on considerations for areas targeted for shellfish and on each subarea's relative rankings established in Chapter 4 (Table 4-22).

2017-2021: Phase 1

- ∞ File Notices of Project Change and Development of Regional Impact (DRI) modifications (as needed/if required) to inform (and gain approval from) the environmental review process on the agreements and funding that will allow the next steps to proceed.
- ∞ Shellfish Propagation expansion in related sections of Popponeset Bay and addition in Jehu Pond and Hamblin Pond).
- ∞ Feasibility Study: Implementing Soft Solutions for Restoring the Quashnet/Moonakis River.
- ∞ Feasibility study on connection of Quashnet and Coombs Schools to Mashpee Commons WWTF.
- ∞ Implement findings of Quashnet/Moonakis River soft solutions (if favorable).
- ∞ Design and Construction of Site 4 facility (Phase 1) to serve sections of Subarea S (within Mashpee River Watershed) adjacent to Falmouth Road/Route 28.
- ∞ Design and Construction of related collection system to serve Site 4 WWTF.
- ∞ Design and Construction of collection system to extend to properties neighboring the Wampanoag WWTF.
- ∞ End of Phase compliance reporting—consider updating MEP Model runs (landuse and hydrodynamic models) and MEP calibrate with water quality and benthic flux sampling as needed.
- ∞ Determine additional evaluations of existing wastewater treatment facilities leading into next phase of proposed improvements.
- ∞ Coordinate with 208 Plan and potentially run CCC MVP tool in conjunction with MEP Model runs to check on updated water data and possible adaptive management approaches.

The estimated cost for Phase 1 infrastructure and long-term shellfish implementation is summarized in Table ES-4.

(continued)



Table ES-4 Estimated Total Present Worth Cost of Recommended Plan—Phase 1

| Estimated Costs ⁽¹⁾ | Phase 1 Implementation with Shellfish Aquaculture |
|--|---|
| Capital Costs | |
| Shellfish Aquaculture (yr1) ⁽⁶⁾ | \$1,500,000 |
| Collection System | \$20,000,000 |
| Treatment System ^(2, 3) | \$11,000,000 |
| Recharge facility ^(3, 4) | \$1,500,000 |
| Total | \$34,000,000 |
| O&M Costs | |
| Shellfish Aquaculture | \$1,500,000 |
| Collection System | \$100,000 |
| Treatment System | \$1,300,000 |
| Recharge Facilities | \$30,000 |
| Total | \$2,900,000 |
| Present Worth O&M ⁽⁵⁾ | \$44,000,000 |
| Total Present Worth | \$78,000,000 |

Notes:

1. Values are rounded to two significant figures and include allowances for fiscal, legal and engineering services, and contingency. Based on an ENR year of 2017.
2. Treatment costs include new facilities and improvements/upgrades to existing facilities. For neighboring communities of Barnstable and Sandwich, collection, treatment, and recharge costs were estimated for planning purposes only; actual location, technology type, and site considerations would need to be determined by each individual community.
3. Allowances for facilities located in Sandwich (not including those proposed to connect to JBCC) and Barnstable (Falmouth assumed to go to JBCC).
4. Estimated costs with shellfish aquaculture presume that existing and future loads are managed through this adaptive management approach, Joint Base Cape Cod is available, and no additional recharge capacity is required.
5. Based on 20 years and 3% interest.
6. Cost does not include Town staff which is currently funded by the Town through their existing program(s).

2022-2026: Phase 2

- ∞ File Notices of Project Change and DRI modifications (as necessary) to inform (and gain approval from) the environmental review process on the agreements and funding that will allow the next steps to proceed.
- ∞ Shellfish Propagation (continuation and future expansion).



- ∞ Design and Construction of JBCC Improvements (or Back Road Site facility if agreement cannot be reached on a regional facility).
- ∞ Design and Construction of JBCC/Back Road Sewer Extensions (Mashpee) to serve Subarea H.
- ∞ If Quashnet/Moonakis soft solutions will not address 100% nitrogen TMDL and regional facility at JBCC is available, Sand-1, -2, and -3 should begin process of being connected to address the Quashnet River area, as should portions of Falmouth (in coordination/conjunction with any efforts regarding their plan and their demonstration projects being considered in that area).
- ∞ Connection of Quashnet and Coombs Schools to Mashpee Commons WWTF, upgrade as required.
- ∞ If shellfish propagation is not advancing as fast as or to the levels anticipated:
 - Site 4 facility expansion (Phase 2) development to serve additional Mashpee River and Popponesset Bay Watershed Mashpee (south of Route 28); with new recharge facilities at Willowbend.
 - Upgrade of Willowbend facility. Upgrade of Stratford Ponds, South Cape Village, and Windchime Point to improve nitrogen removal performance in conjunction with age of system improvements.
 - Mashpee River sewer extension (south of Route 28).
 - Popponesset Bay sewer extension (south of Route 28, south of Willowbend).
 - In conjunction with their planning efforts, Barnstable to address portions of Cotuit peninsula.
- ∞ End of Phase compliance reporting—consider updating MEP Model runs (landuse and hydrodynamic models) and MEP calibrate with water quality and benthic flux sampling as needed.
- ∞ Coordinate with 208 Plan and potentially run CCC MVP tool in conjunction with MEP Model runs to check on updated water data and possible adaptive management approaches.
- ∞ Determine additional evaluations of existing wastewater treatment facilities leading into next phase of proposed improvements.

2027-2031: Phase 3

- ∞ File Notices of Project Change and DRI modifications (as necessary) to inform (and gain approval from) the environmental review process on the agreements and funding that will allow the next steps to proceed.
- ∞ Shellfish Propagation (continuation and future expansion).
- ∞ If shellfish propagation continues to lag or is not advancing as fast or to the levels anticipated:
 - Upgrade of Southport to improve nitrogen removal performance.
 - Site 4 facility expansion with sewer extension to serve Mashpee River and Popponesset Bay Watershed Mashpee (north of Route 28) with associated sewer extensions.
 - Expansion of Willowbend WWTF service area.
 - Site 6 facility development initially to serve Ockway Bay area.



- New Seabury recharge facilities construction to support treated effluent from Mashpee Commons and Site 6.
- Barnstable and Sandwich to begin provisions to address their remaining portions of the Popponesset Bay Watersheds.
- ∞ End of Phase compliance reporting—consider updating MEP Model runs (landuse and hydrodynamic models) and MEP calibrate with water quality and benthic flux sampling as needed.
- ∞ Coordinate with 208 Plan and potentially run CCC MVP tool in conjunction with MEP Model runs to check on updated water data and possible adaptive management approaches.
- ∞ Determine additional evaluations of existing wastewater treatment facilities leading into next phase of proposed improvements.

2032-2036: Phase 4

- ∞ File Notices of Project Change and DRI modifications (as necessary) to inform (and gain approval from) the environmental review process on the agreements and funding that will allow the next steps to proceed.
- ∞ Upgrade of Cotuit Meadows and Wampanoag Village to improve nitrogen removal performance (dependent on MEP modeling results and permit requirements).
- ∞ If shellfish propagation continues to lag or is not advancing as fast or to the levels anticipated:
 - Site 6 facility expansion with associated sewer extensions to serve Hamblin/Jehu Pond areas of Mashpee.
 - Collection system expansion to Site 6.
 - Collection system expansion on Great Neck Road North to Mashpee Commons.
 - Collection system expansion for Hamblin and Jehu Pond Areas, upgrade/expansion of New Seabury WWTF.
- ∞ End of Phase compliance reporting—consider updating MEP Model runs (landuse and hydrodynamic models) and MEP calibrate with water quality and benthic flux sampling as needed.
- ∞ Coordinate with 208 Plan and potentially run CCC MVP tool in conjunction with MEP Model runs to check on updated water data and possible adaptive management approaches.
- ∞ Determine additional evaluations of existing wastewater treatment facilities leading into next phase of proposed improvements.

2037-2041: Phase 5

- ∞ File Notices of Project Change and DRI modifications (as necessary) to inform (and gain approval from) the environmental review process on the agreements and funding that will allow the next steps to proceed.
- ∞ If shellfish propagation continues to lag or is not advancing as fast or to the levels anticipated:
 - Remaining wastewater nitrogen from Barnstable (B-37 and parts of B-38) and Sandwich Subareas (Sand-4, -5, and -6) within the Popponesset Bay watersheds will need to be



removed outside of the watershed or treated to the levels required based on the MEP modeling results.

- Collection system expansion (Main Street /Route 130) Subarea T to Site 4.
- Collection system expansion to Subareas A and C (Seconsett and Monomoscoy Islands).
- Collection system expansion to Childs River watershed portion of Subarea H.
- ∞ End of Phase compliance reporting—consider updating MEP Model runs (landuse and hydrodynamic models) and MEP calibrate with water quality and benthic flux sampling as needed.

This schedule represents one possible future where the PPA is forced to implement traditional infrastructure to serve those areas outside of the Quashnet River Watershed where shellfish aquaculture is being pursued to reduce nitrogen loadings within the affected bays. Development of MOUs with neighboring towns will be necessary to establish a potential phasing strategy based on each town’s specific needs. Towns may address other “neighborhoods” within the watersheds based on each individual town’s planning efforts and approach. Monitoring and modeling efforts at the five-year intervals will be necessary to establish the extent of nitrogen removal following shellfish aquaculture implementation.

ES.8 Next Steps

Due to the long duration and complexity of this project as well as the inclusion of a number of different stakeholders who are critical to the success of achieving the TMDLs, there are several items that will need to be addressed following the submittal of the plan. This is a function of several different initiatives that are proceeding concurrently with this project, most notably:

- ∞ The ongoing 208 Planning Process going on through Barnstable County and the Cape Cod Commission.
- ∞ Joint Base Cape Cod and Mass Development evaluations of the existing utilities (electrical, water, sewer, etc.) at the existing base and ownership discussions regarding these utilities.
- ∞ Town of Barnstable Nutrient Management Planning efforts Town-wide, as they are related to the portions of Cotuit within the PPA.
- ∞ Town of Falmouth Comprehensive Wastewater Management Planning efforts related to the “South Coast” embayments including Waquoit Bay.
- ∞ Town of Sandwich Comprehensive Planning efforts and future development projects being evaluated.
- ∞ Commonwealth of Massachusetts planning efforts related to the use of alternative approaches and technologies related to nutrient removal (primarily on Cape Cod, Southeastern Massachusetts, and Buzzards Bay).

With this in mind, there are several key steps/decisions/directions in wastewater and nitrogen management planning that will help in the completion of the Recommended Plan and its implementation over the next several decades.



These include:

- ∞ Cape Cod Commission and MassDEP direction on the enforcement and permitting issues associated with the TMDLs, such that each town within the Project Planning Area will have a clear understanding of their regulatory obligation and therefore will be able to create the necessary structure to monitor, manage, and enforce TMDL compliance, whether that be through a Board of Health, Sewer Commission, Department of Public Works, Sewer Department, Sewer District, or other structure. This is outside the control of the Town(s) and Districts related to this project.
- ∞ Development of a long-term monitoring program. Because the groundwater travel patterns, times, and estuary flushing conditions are influenced by a number of factors, an appropriate plan will need to be developed by the Towns and the regulatory agencies to monitor the effectiveness of the plan in meeting the TMDLs.
- ∞ Continue to discuss ownership of collection systems, management options, development versus build-out impact on costs. (This will be an ongoing function of implementation as the Town/District will not need to own all facilities initially, but should have documents in place to ease the transition when those facilities are required to be transferred, if necessary).
- ∞ Financial planning of phasing and bonding in increments. (This cannot be determined until the Water/Sewer District structure and rate schedule is established and ownership of existing facilities is resolved; this will be an ongoing part of implementation.)

The following items will need to be completed as part of the plan's implementation:

- ∞ Identification of the plan's funding mechanism (betterments, taxes, rates, and fees).
- ∞ Private facilities acquisition/ownership/operations/maintenance.
- ∞ Additional effluent disposal site evaluations and hydrogeological evaluations.
- ∞ Securing of facility, cluster, and PRB sites and pumping station locations.
- ∞ Development of Sewer Regulations.
- ∞ Development of Sewer Rate Structure.
- ∞ Phosphorus removal considerations (upgradient of fresh water systems).
- ∞ Development of a detailed Adaptive Management Plan and long-term TMDL monitoring (for fresh and salt water).
- ∞ Town/District rules and bylaws related to projected wastewater flows (growth/flow neutral).
- ∞ Introduction of new Mashpee Water and Sewer District to neighboring communities related departments.
- ∞ Cost sharing between neighboring communities and districts and MOU development for all aspects of the project.
- ∞ Scoping and development of subsequent implementation and planning steps including: adaptive management and additional studies.
- ∞ Completion of the Feasibility Study related to the Quashnet/Moonakis River.



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Glossary of Common Acronyms

| | |
|----------|--|
| ACEC | Area of Critical Environmental Concern |
| AM | Adaptive Management |
| ARC | Aquacultural Research Corporation |
| ASAR | Alternatives Screening Analysis Report |
| ASCE | American Society of Civil Engineers |
| ASCE/SEI | American Society of Civil Engineers/Structural Engineering Institute |
| AS/EA | Activated Sludge/Extended Aeration |
| | |
| BFE | Base Flood Elevation |
| BMP | Best Management Practices |
| BOD | Biochemical Oxygen Demand |
| BOH | Board of Health |
| BWSC | Boston Water and Sewer Commission |
| | |
| CAC | Community Advisory Committee |
| CCC | Cape Cod Commission |
| CEC | Contaminants of Emerging Concern |
| CFR | Code of Federal Regulations |
| CLF | Conservation Law Foundation |
| CMR | Code of Massachusetts Regulations |
| COD | Chemical Oxygen Demand |
| CPR | Coastal Pollution Remediation |
| CWMP | Comprehensive Wastewater Management Plan |
| CWSRF | Clean Water State Revolving Fund |
| CZM | Coastal Zone Management |
| | |
| DCPC | District of Critical Planning Concern |
| DCR | Department of Conservation and Recreation |
| DEIR | Draft Environmental Impact Report |
| DEP | Department of Environmental Protection |
| DMF | Division of Marine Fisheries |
| DO | Dissolved Oxygen |
| DPW | Department of Public Works |
| DRI | Development of Regional Impact |
| DRP | Draft Recommended Plan |



| | |
|---------|--|
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| ENF | Environmental Notification Form |
| ENR | Engineering News Record |
| EOEEA | Executive Office of Energy and Environmental Affairs |
| EPA | Environmental Protection Agency |
| FEIR | Final Environmental Impact Report |
| FEMA | Federal Emergency Management Agency |
| GHG | Greenhouse Gas |
| gpd | Gallons per day |
| GWDP | Groundwater Discharge Permit |
| HAB | Harmful Algae Blooms |
| I/A | Innovative and Alternative |
| I/I | Infiltration and Inflow |
| IMA | Inter-municipal Agreement |
| IUP | Intended Use Plan |
| JBCC | Joint Base Cape Cod |
| kg/yr | Kilograms per year |
| kW | Kilowatts |
| LCP | Local Comprehensive Plan |
| LSP | Licensed Site Professional |
| MassCEC | Massachusetts Clean Energy Center |
| MassDEP | Massachusetts Department of Environmental Protection |
| MBR | Membrane Bio-Reactor |
| MEC | Mashpee Environmental Coalition |
| MEMA | Massachusetts Emergency Management Agency |
| MEP | Massachusetts Estuaries Project |
| MEPA | Massachusetts Environmental Policy Act |
| MET | Massachusetts Environmental Trust |
| mgd | Million gallons per day |



| | |
|--------|---|
| M.G.L. | Massachusetts General Law |
| mg/L | Milligrams per liter |
| MHC | Massachusetts Historical Commission |
| MLE | Modified Ludzack Ettinger |
| MMR | Massachusetts Military Reservation |
| MOU | Memorandum of Understanding |
| MSL | Mean Sea Level |
| MT | Metric Ton |
| MW | Megawatt |
| | |
| NAR | Needs Assessment Report |
| NEPA | National Environmental Policy Act |
| NHESP | Natural Heritage and Endangered Species Program |
| NOAA | National Oceanic and Atmospheric Administration |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | Nonpoint Source |
| NS | New Seabury |
| NSSP | National Shellfish Sanitation Program |
| | |
| OSHA | Occupational Safety and Health Administration |
| O&M | Operations & Maintenance |
| | |
| PEF | Project Evaluation Form |
| PGP | Programmatic General Permit |
| PPA | Project Planning Area |
| ppb | Parts per billion |
| ppm | Parts per million |
| PRB | Permeable Reactive Barrier |
| PV | Photovoltaic |
| | |
| RBC | Rotating Biological Contactor |
| RIB | Rapid Infiltration Bed |
| RME | Responsible Management Entity |
| RP | Recommended Plan |
| RVA | Regina Villa Associates |



| | |
|--------|---|
| SBR | Sequencing Batch Reactor |
| SCADA | Supervisory Control and Data Acquisition |
| sf | Square Foot |
| SMAST | School of Marine Science and Technology |
| SRF | State Revolving Fund |
| STEG | Septic Tank Effluent Gravity |
| STEP | Septic Tank Effluent Pump |
| SWPPP | Stormwater Pollution Prevention Plan |
| | |
| TMDL | Total Maximum Daily Load |
| TN | Total Nitrogen |
| TOC | Total Organic Compounds |
| TP | Total Phosphorus |
| TPW | Total Present Worth |
| TSS | Total Suspended Solids |
| | |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| UV | Ultraviolet |
| | |
| VFD | Variable Frequency Drives |
| VOC | Volatile Organic Compounds |
| | |
| WBNERR | Waquoit Bay National Estuarine Research Reserve |
| WMA | Waste Management Agency |
| WNMP | Watershed Nitrogen Management Plan |
| WPA | Wetlands Protection Act |
| WPCF | Water Pollution Control Facility |
| WQMC | Water Quality Management Committee |
| WWTF | Wastewater Treatment Facility |
| WWTP | Wastewater Treatment Plant |
| W&S | Weston & Sampson |



1 Introduction

1.1 Project Identification and Purpose

The Town of Mashpee initiated their Watershed Nitrogen Management Plan (WNMP) in 1999 in order to address the nitrogen impacts to coastal embayments and to evaluate options for restoring those embayments through the development of a Comprehensive Wastewater Management Plan (CWMP). Because the contributing areas to the estuaries (watersheds) are shared by multiple towns, Mashpee's WNMP Project Planning Area (PPA) includes the Town of Mashpee and the portions of neighboring towns (Barnstable, Falmouth, and Sandwich) that fall within the Popponesset Bay and Waquoit Bay East Basin watersheds. The Project Planning Area is illustrated in Figure 1-1. The WNMP/CWMP is intended to provide an environmentally and economically sound plan for nitrogen reduction, wastewater treatment, and treated water recharge in the Project Planning Area.

The CWMP is the culmination of multiple documents resulting in this report which is the Final Recommended Plan and Final Environmental Impact Report (EIR).

The purpose of the Final Recommended Plan and Final Environmental Impact Report is to present the recommendations of this planning process to address the nitrogen Total Maximum Daily Loads (TMDLs) established for Popponesset Bay and Waquoit Bay's eastern basin, and discuss the mitigation measures and implementation approach to address these needs as identified in previous documents.

Prior to presenting the components of the WNMP/CWMP, it is necessary to provide background on the other work that is related to this overall wastewater planning process. The purpose of this Chapter is to identify the previous Massachusetts Environmental Policy Act (MEPA) submittal/planning documents and identify the Massachusetts Estuaries Project (MEP) documents and their general findings which are an integral part of this planning project. This Chapter will also identify previous studies, whereas subsequent chapters will discuss the public outreach program, the Draft Recommended Plan, and present the Final Recommended Plan and environmental impacts and implementation schedule.

1.2 MEPA Planning Documents

In September of 2001, the Town of Mashpee through the Mashpee Sewer Commission, entered into the MEPA process by filing their Environmental Notification Form (ENF) and MEPA Unit/Cape Cod Commission Joint Review Process Application Form. As part of that document several major deliverables were identified to be submitted for review through this process.

In addition, since the start of this project, two (2) Notices of Project Change (in 2007 and 2012) have been issued and their certificates are included in the 2013 Alternatives Screening Analysis Report (ASAR). Responses to the comments that resulted from the Notice of Project Change were provided in that report.

The first major deliverable for the WNMP was the **Needs Assessment Report (NAR)**—issued in April 2007. The Needs Assessment Report was designed to develop the understanding of existing and future conditions in the Project Planning Area. The NAR summarized information on existing wastewater facilities (septic systems and small treatment plants), physical/environmental features, demographics, land use patterns, and regulatory issues affecting wastewater facilities. The NAR projected future conditions for the Project Planning Area relating to population, growth, and the potential effects of that growth on any proposed wastewater collection, treatment, and disposal facilities.



The second major deliverable was the **Technology Screening Report**—issued in November 2007—which outlined various centralized and decentralized wastewater collection, treatment, and disposal technologies, and the advantages and disadvantages of each. It provided recommendations of technologies to be considered for use in the development of the scenarios, and ultimately the Recommended Plan for addressing nitrogen. The Technology Screening Report and the following Draft Alternative Scenarios Analysis and Site Evaluation Report findings and updates were combined with additional items identified in the project's scope as called out in the NAR and ENF to create the Alternatives Screening Analysis Report for MEPA submittal and review.

The third major deliverable was the **Draft Alternative Scenarios Analysis and Site Evaluation Report**—issued in March 2008—this was the preliminary evaluation of potential recharge sites and development of alternative scenarios to meet the nitrogen removal needs of the Project Planning Area.

The fourth major deliverable and second formal MEPA submittal was the **Alternatives Screening Analysis Report**—issued in August 2013. This document expanded upon the Draft Alternative Screening Evaluation and Site Evaluation Report issued in 2008, and presented the findings of the MEP modeling work and provided a description of the eight scenarios/options that were developed to meet the nitrogen TMDLs. These findings were then used to present a framework for the development of the Draft Recommended Plan/Draft Environmental Impact Report (DRP/DEIR).

Following the submittal of the ASAR, MEPA issued their certificate dated November 1, 2013. This document was included in Appendix 1-2 of the DRP/DEIR, and the response to the comments resulting from that submittal can be found in the same Appendix of that report.

The fifth major deliverable and third formal MEPA submittal was the **Draft Recommended Plan/ Draft Environmental Impact Report (DRP/DEIR)**—issued in June 2014. This document presented the recommendations developed as part of this planning process to address the TMDLs established for Popponesset Bay and Waquoit Bay's eastern basin, and discussed the mitigation measures and implementation approach for Mashpee and the neighboring communities within the Project Planning Area. MEPA issued their most recent certificate dated September 12, 2014. This document is included in Appendix 1-1, and the response to the comments resulting from that submittal can be found in the same Appendix.

Copies of these previous reports by Stearns & Wheler/GHD are included in Appendix 1-2.

1.3 Massachusetts Estuaries Project (MEP) Findings

The MEP program was developed to evaluate the health of Massachusetts' estuaries and to establish nitrogen loading thresholds that can be used as management goals for a watershed. The MEP approach and results are discussed in detail in Chapter 4 of the Needs Assessment Report. In addition, the following reports and documents relevant to the Project Planning Area have been produced as part of MassDEP, University of Massachusetts Dartmouth School of Marine Science and Technology (SMAST), and MEP work:

- ∞ "Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for Popponesset Bay, Mashpee and Barnstable, Massachusetts" Final Report; September 2004.



- ∞ “Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Quashnet River, Hamblin Pond, and Jehu Pond, in the Waquoit Bay System of the Towns of Mashpee and Falmouth, MA” Final Report; January 2005.
- ∞ “FINAL DRAFT: Quashnet River, Hamblin Pond, Little River, Jehu Pond, and Great River in the Waquoit Bay System Total Maximum Daily Loads for Total Nitrogen”; October 14, 2005.
- ∞ “FINAL: Popponeset Bay Total Maximum Daily Loads for Total Nitrogen”; December 5, 2006.
- ∞ MEP Technical Memo “Popponeset Bay: Results Pilot Modeling Scenarios – Final”; June 15, 2006.
- ∞ MassDEP “Inter-municipal Watershed Planning and TMDL Implementation to Restore Embayment Water Quality on Cape Cod: Three Case Studies of Towns Sharing Coastal Watersheds”; November 2008.
- ∞ MEP Technical Memo “Report on Unified Database and Requested MEP Scenarios”; November 13, 2009.
- ∞ MEP Technical Memo “Report on Revised MEP Scenario 3 for Eastern Basins of Waquoit Bay System”; February 9, 2010.
- ∞ “Linked Watershed-Embayment Approach to Determine Critical Nitrogen Loading Thresholds for the Waquoit Bay and Eel Pond Embayment System – Towns of Falmouth and Mashpee, Massachusetts” Final Report; March 2013.
- ∞ MEP Technical Memo “ Scenarios Results for Popponeset Bay and Waquoit Bay based on MEP Linked Models”; November 15, 2012 (revised).

Results obtained through the MEP monitoring and modeling are used to provide one possible scenario (as presented by MEP) to achieve the nitrogen limits for a given estuary. Table 1-1 summarizes the suggested nitrogen removal rates as identified in those reports from septic systems in the subwatersheds of Popponeset Bay and Waquoit Bay East under “existing” (2001) conditions as presented as part of the original reports and as updated based on the 2013 Final MEP Report for Waquoit Bay. The updates reflect the Massachusetts Estuaries Project re-modeling under conditions of the entire Waquoit Bay Estuary and watershed system versus the eastern portions of that system originally modeled in 2006.

(continued)



Table 1-1 Estimated Percent Nitrogen Removals from Septic Systems

| Embayment System | Embayment | Percent Removal to Meet Threshold ⁽³⁾ | Updated Percent Removal to Meet Threshold ⁽³⁾ |
|--|----------------------------------|---|---|
| Popponneset Bay System ⁽¹⁾ | Popponneset Bay | 0% | 0% |
| | Popponneset Creek | 100% | 100% |
| | Pinquickset Cove | 0% | 0% |
| | Ockway Bay | 100% | 100% |
| | Mashpee River | 100% | 100% |
| | Shoestring Bay | 100% | 100% |
| | Mashpee River ⁽⁴⁾ | 49% | 49% |
| | Santuit River ⁽⁴⁾ | 35% | 35% |
| | Quaker Run River ⁽⁴⁾ | 0% | 0% |
| Waquoit Bay System ^{(2) (6)(7)} | Hamblin Pond | 75% | 100% |
| | Upper Hamblin Pond | 75% | 100% |
| | Little River | 75% | 100% |
| | Lower Great River | 100% | 100% |
| | Upper Great River | 100% | 100% |
| | Jehu Pond | 100% | 100% |
| | Upper Quashnet River | 67% | 67% |
| | Lower Quashnet River | 67% | 67% |
| | Red Brook ⁽⁴⁾ | 75% | 90% |
| | Quashnet River ^(4, 5) | 67% | 67% |

Notes:

1. Source: Table B-1 of *Final Popponneset Bay Total Maximum Daily Loads for Total Nitrogen*, April 10, 2006, no change in the “updated column”.
2. Source: Table B-1 of *Final Draft Quashnet River, Hamblin Pond, Little River, Jehu Pond, and Great River in the Waquoit Bay System Total Maximum Daily Loads for Total Nitrogen*, October 14, 2005.
3. Based on one MEP developed scenario that is considered one of many potential scenarios to achieve the target concentration.
4. Indicates a surface water source.
5. MEP report lists this as Moonakis River. However, based on information provided by the Mashpee Town Planner, Moonakis River is only the lower, brackish portion of this river (Moonakis referring to the name given to the river in the Town of Falmouth).
6. Source: Updated Column Table VIII-2 of *Revised Draft Linked Watershed-Embayment Approach to Determine Critical Nitrogen Loading Thresholds for the Waquoit Bay and Eel Pond Embayment System Towns of Falmouth and Mashpee, Massachusetts*, May 2012.
7. Although portions of Mashpee fall within the Childs River Watershed, the entire Childs River Watershed is not part of the Project Planning Area, and therefore its removal requirements aren't provided.

Figure 1-2 shows the various subwatersheds and the updated removal percentages identified in Table 1-1. These percent removals form the initial basis used for the development of the alternative scenarios/options presented in the ASAR. This information and the results of the work of the ASAR have been used in the formation of the Recommended Plan.



1.4 Previous Planning Documents

In addition to the reports and planning documents discussed in Sections 1.2 and 1.3, the following additional documents were prepared. A summary of these documents is also included in Chapter 2 of the Draft Recommended Plan/Draft Environmental Impact Report (DRP/DEIR):

- ∞ Technical Memorandum on Development of Options 1A, 1B, and 1C (2012).
- ∞ MEP Model Results—Options 1A, 1B, and 1C (2012).
- ∞ Overview of the 2009 Water Quality Monitoring Program for the Popponesset Bay and Waquoit Bay Estuaries; June 2010.
- ∞ Popponesset Bay: Results Pilot Project Modeling Scenarios – Final – June 2006.
- ∞ Final Popponesset Total Maximum Daily Loads for Total Nitrogen (Report #96-TMDL-4); December 2006.
- ∞ Final Quashnet River, Hamblin Pond, Little River, Jehu Pond, and Great River in the Waquoit Bay System for Total Maximum Daily Loads for Total Nitrogen (Report #96-TMDL-5); January 2006.
- ∞ Community Preservation Funding Application – Shellfish Propagation/Estuary Restoration; Rick York; February 2013.
- ∞ Shellfish Plan for Nitrogen Removal; Rick York; June 20, 2013.
- ∞ Technical Report – Intensive (Locational) Archaeological Survey Site 4 at Mashpee Transfer Station and Landfill Property; PAL; September 2010.
- ∞ Hydraulic Load Test – Site 4 (Transfer Station) Technical Memorandum; GHD; 2012, updated 2014 (Appendix 1-3).
- ∞ USGS – The Simulated Effects of Wastewater Management Actions on the Hydrologic System and Nitrogen Loading Rates to Wells and Ecological Receptors, Popponesset Bay Watershed, Cape Cod, Massachusetts – Report 2013-5060.
- ∞ Sewer Modeling and Preliminary Design Evaluations Guidance Document and Case Study Report; Stearns & Wheeler, LLC; November 2005.
- ∞ Inter-municipal Watershed Planning and TMDL Implementation to Restore Embayment Water Quality on Cape Cod: Three Case Studies of Town's Sharing Coastal Watersheds; MassDEP/SMASST; Nov 2008.
- ∞ Appraisal Consulting Services for the Wastewater Treatment System at the Massachusetts Military Reservation; CH2MHill; December 2012.
- ∞ Town of Mashpee, Popponesset Bay, & Waquoit Bay East Watersheds – Nitrex TM Technology Scenario Plan; Lombardo Associates, Inc.; April 2010.
- ∞ Enhancing Wastewater Management on Cape Cod: Planning, Administrative and Legal Tools; Wright-Pierce; July 2004.



2 Summary of Cape Cod Commission Draft 208 Planning Document

2.1 Introduction

This Chapter summarizes the Draft 208 Water Quality Plan developed by the Cape Cod Commission (CCC). The final document is anticipated to be completed and accepted by United States Environmental Protection Agency (USEPA) by September 15, 2015. This document will focus on the draft document dated August 2014. The Cape Cod Commission's documents can be found on their Web page at www.capecodcommission.org. This Chapter is not intended to summarize the entire document, but focus on those aspects as they relate to the Town of Mashpee's plan.

The following sections, using the names from the Draft 208 Plan chapters, will summarize Mashpee's efforts in relation to the efforts of the 208 document.

2.2 Community Engagement

As identified in Chapter 3 of this document, the Town of Mashpee has spent a significant effort in public participation and outreach regarding this project. The public outreach and stakeholder involvement as part of the 208 Plan and as described in the first chapter of that document focuses on the update to the 1978 208 Plan and the extensive public engagement process that the Cape Cod Commission employed to complete their update.

The recommendation presented at the end of that chapter focused on "managing disagreement". Through the 208 Plan, the Cape Cod Commission has identified some methods that may be employed to manage disagreements in the implementation of the Mashpee plan and offers county resources to help achieve resolutions as Mashpee moves forward collaboratively with its neighboring communities and their residents to complete this important task of cleaning up and protecting their natural resources, and primarily their coastal embayments.

2.3 The People and the Place

As discussed in the Needs Assessment Report the Town of Mashpee has documented the Project Planning Area's existing environmental resources and demographics. The 208 Plan discusses these with a regional perspective and the efforts to develop the TMDLs for nitrogen among other impacts to fresh water systems and drinking water/groundwater supplies. These same topics are reviewed throughout Mashpee's documents including all the MEP related efforts and technical memorandums developed specifically regarding Mashpee's watersheds and pilot projects reviewing these same resources and summaries of the planning areas natural environments.

As a brief update to the Town's demographics based on information provided by the Town Planner: in 2014 the year-round population was 14,842, with a summer peak day population of 33,847, with 6,384 homes occupied year-round and 3,558 summer-only. Projected build-out population is 22,704 in 9,790 year-round occupied homes, with summer build-out population of 35,928 and 3,046 summer-only homes. Total private housing units are projected to increase from 10,313 in July 2014 to 12,836 at build-out, or 24.5%.

Mashpee is essentially built-out as regards its development pattern, with the only significant property remaining to be developed being the Mashpee Commons project, which is/will be a compact New Urbanist



development supported by a private sewer system which may become part of the municipal system. All other remaining development is either infill lots in existing subdivisions or remaining portions of compact developments (New Seabury, Southport, Quashnet Valley) which were permitted in the 1960s and 70s and are “grandfathered” from current or future zoning requirements. Remaining New Seabury and Southport development is being connected to their private wastewater systems, which may become part of the municipal system. Otherwise, the proposed early-phase wastewater facilities are targeting high-density existing developed areas.

2.4 Nutrient Mitigation Technologies and Policies

As part of Mashpee’s planning process, the project has spent a significant amount of effort discussing a wide selection of technologies—some more traditional than others. This discussion can be found in several of the reports including the Technology Screening Report, Alternatives Screening Analysis, and the Draft Recommended Plan, and have included a wide range of technologies from onsite systems to traditional wastewater treatment facilities to shellfish aquaculture. Copies of each of these reports, evaluations, and analysis have been included on CD as part of Appendix 1-2.

The CCC 208 Plan established a technology matrix considering the relation between technologies and the area of application. Technologies/strategies were grouped as “Remediation”, “Reduction”, and “Prevention”, and assigned by scale to “Site Scale”, “Neighborhood”, “Watershed”, and “Cape Wide”. Technologies were also grouped into several categories (see Table 3-1 of the CCC Draft 208 Plan).

Since the development of these reports and as part of the 208 Planning process, several additional technologies have been identified or are receiving further review and piloting including:

- ∞ Phytoirrigation
- ∞ Phytoremediation
- ∞ Fertigation Wells – Turf
- ∞ Fertigation Wells – Cranberry Bogs
- ∞ Urine Diverting Toilets
- ∞ Floating Constructed Wetlands
- ∞ Surface Water Remediation Wetlands
- ∞ Ocean Outfall (previously identified but regulations changed regarding allowable use)

Similar to Mashpee’s Technology Screening Report and subsequent documents, the 208 Plan reviews how each technology works, performs, estimated costs, and considerations in use.

Some of the above referenced technologies/approaches like urine diverting toilets and fertigation wells are simply expansions of the Town’s existing eco-toilet allowances and fertilizer bylaws where these could be applied. However, the Town is not actively seeking their use as part of the plan, but are not restricting their use. Phytobuffers/phytotechnology are similar to the “SolarAquatics” type of treatment technologies and also stormwater BMPs discussed within the previous planning documents.

Floating constructed wetlands are another interesting approach that will require—like many other new technologies—piloting and permitting. These systems, depending on their location, may impact navigation and the protection of the near-shore from storm surge. These may also have aesthetic impacts associated with them which would need to be taken into consideration if the Town considers their use as part of their



adaptive management program in the future. These systems do not manage source impacts and would be considered a Direct Environmental Mitigation approach.

Ocean outfalls were also identified by Department of Environmental Protection (DEP) for consideration. Although not being considered now, an ocean outfall could be considered as part of the future phasing if the shellfish program does not perform to the levels needed, New Seabury's golf course falls through, and impacts of sea-level rise become of greater concern to the implementation of the plan. The Town may also consider use of an ocean outfall through an adaptive management approach.

2.5 The Cape Cod Model—Technical Review

The CCC developed “bookend” approaches to look at each watershed on Cape Cod and take a strictly traditional infrastructure approach and compare it to one where sewers were avoided to the greatest extent possible.

The Town of Mashpee started with a watershed approach when considering its Project Planning Area and looked beyond its boundaries to consider impacts and recommendations for the neighboring communities of Barnstable, Falmouth, and Sandwich.

As part of the Mashpee planning process, a similar technology review approach was taken. At the time the TMDLs for the Waquoit Bay East watersheds and Popponesset Bay watersheds were issued, as part of the MEP evaluations the Town ran a scenario of seeing if the TMDLs could be addressed through I/A technologies at individual lots (in conjunction with the existing wastewater treatment facility's). It was determined that this approach would not achieve the TMDLs. In addition, the Mashpee Shellfish Constable evaluated the removal of nitrogen at the embayments with shellfish and established the percent removals he believed could conservatively be met. Based on that approach he found that not all watersheds could be addressed, for example Quashnet River/Moonakis River could not support shellfish, and Mashpee River and Shoestring Bay could only support removal of about 50% of the load. GHD also performed a full traditional approach using collection, treatment and recharge facilities to address the TMDLs for the Project Planning Area. This could be done, but at a very high cost.

As a result of this, Mashpee developed its hybrid approach to maximize the use of shellfish aquaculture and minimize traditional infrastructure, and reuse existing infrastructure to the fullest extent possible including the recommendation to use Joint Base Cape Cod (JBCC). In addition, although not formally seeking to take nitrogen credit for its use as part of the plan, the Town developed a fertilizer/nitrogen bylaw (included in Appendix 4-3) to further support the reduction of nitrogen in its waterbodies. Also, the Town DPW actively employs BMPs where practical to reduce bacteria and other contaminants from entering Mashpee's waterbodies.

As part of the 208 Plan, new tools are being made available; however, a number of these screening and evaluation tools are geared towards communities in the beginning stages of these processes. Mashpee will consider the use of these tools at their permitting cycles if shellfish performance is not approaching the necessary goals and other alternative means of achieving TMDLs are being sought. This is identified in Chapter 9 regarding implementation and Chapter 10 regarding adaptive management.

These tools with current data will allow the Town to check on nitrogen loading considerations and be used in the update of the MEP modeling necessary to show conformance to the TMDLs.



According to the CCC Watershed Prioritization – Upper Cape (Table 4-2, CCC 208 Plan, 2014), Waquoit Bay was ranked first and Popponesset Bay seventh out of 22 watersheds in the Upper Cape.

2.6 Regulations

Throughout the planning process, Mashpee has identified the various regulatory requirements and is actively going through the MEPA/DRI process with the Massachusetts Secretary of Energy and Environmental Affairs and the Cape Cod Commission.

These regulations are discussed in the following sections of the planning process:

- ∞ Needs Assessment Report: Chapter 3 Regulatory Issues.
- ∞ DRP/DEIR: Chapter 8 Draft Section 61 Findings and Mitigation Measures.
- ∞ Chapter 8 of this Report.

As part of this planning process and implementation, Mashpee and its neighboring communities are waiting on Massachusetts Department of Environmental Protection (MassDEP) to see what the watershed permitting will look like; and Mashpee will continue to work with all the regulatory agencies in relation to the implementation of the plan as outlined in Chapter 8 – Draft Section 61 Findings and Mitigation Measures.

As discussed in Chapter 9 under implementation, the Town of Mashpee is currently considering two approaches for the management and implementation of the Recommended Plan.

1. Development of a Water and Sewer District.
2. Town of Mashpee management.

Since the issuance of the Draft Recommended Plan report, the Town is reconsidering creation of the Mashpee Water & Sewer District; and discussions between the Town and Mashpee Water District regarding a Memorandum of Understanding (MOU)—except metering and billing—have been halted by the Board of Selectmen. This was a change in the Selectmen’s previous position regarding the District formation. The Board of Selectmen voted to recommend against creation of the District at the end of 2014. At this time, the District will only come into existence upon a favorable ballot vote at the May 16, 2015 Town election; however, the Mashpee Selectmen are now recommending a “no” vote. Either way, the structure and management authority will be known before implementation of this plan.

In addition, the CCC 208 Planning process is required to identify the responsible party for each watershed. However, the final determination and acceptance of these recommendations by USEPA is not expected until September 15, 2015.

2.7 Planning and Growth Management

As discussed in the CCC 208 Plan Chapter 6 on Planning and Growth, Mashpee efforts are cataloged through April 2014, prior to the submittal of the DRP/DEIR in September 2014. Use of JBCC is also discussed as it was in the Mashpee DRP/DEIR and in this report.

Mashpee has had the advantage of the Town’s Planner also being the Chair of the Sewer Commission—the Commission being the shepherds of the current plan—and therefore growth and development has always been on the forefront of the work performed. As the Town approaches the completion of the plan



and looks to position itself for State Revolving Funds (SRF), the Town intends to propose a Growth Neutral bylaw similar to that adopted by the Town of Falmouth.

When considering open space and land use, the Town's Transferrable Development Rights zoning by-law (Open Space Incentive Development) was adopted in 1987, requiring 50% open space in specific mapped areas and targeting the resulting development to other specific areas, as well as providing density bonuses as an incentive for transfers, including a bonus for sewerage. Mandatory cluster subdivision, with a minimum of 50% open space and incentives for a larger percentage, was adopted in 2006 (replacing cluster zoning provisions that dated back to 1963 and 1971 which were used in the large majority of non-condo developments since then).

Regarding past land acquisitions protective of the Mashpee River, it should be noted that, building on the extensive ownership of lands along the River by The Trustees of Reservation since 1949, the Town and Massachusetts Division of Fish and Wildlife have, beginning in the mid-1980s, acquired every undeveloped parcel of land along the River at a cost of over \$8 million. Mashpee has protected over 1,826 acres of land under the control of the Conservation Commission and an additional 405 acres under the Land Bank Act which are controlled by the Board of Selectmen, along with more than 159 acres of other Town-owned land with open space restrictions. In addition, 266 acres are owned by the US Fish & Wildlife Service, 265 acres are owned or restricted from development by the US Military in clear zones related to the aviation activities at Joint Base Cape Cod, 1,170 acres are owned by Mass DFW or Department of Conservation and Recreation (DCR), 1,331 acres are private condo or cluster subdivision protected open space, 177 acres are protected well sites owned by the Mashpee Water District, 474 acres is owned by land conservation trusts, 64 acres of Falmouth Rod & Gun Club land are subject to a conservation restriction, and 482 acres are subject to Chapter 61 current use taxation restrictions, for a total of 6,619 acres protected of the total town land area of 14,894 acres (44.4%). Another 1160 acres owned by the US government lies within Joint Base Cape Cod, and approximately 1,000 acres lies within the layouts of public and private roadways.

2.8 Cost and Financial Affordability

The CCC 208 Plan summarizes the funding opportunities available to communities and these too have been discussed and reviewed as part of Mashpee's planning process in Chapter 9 - Phasing and Implementation of both the DRP/DEIR and this report.

The Town of Mashpee has yet to determine all of the funding opportunities they will seek or employ as part of implementation of their plan. The team is working with a consultant through the Cape Cod Water Protection Collaborative on this effort.

2.9 Recommendations and Implementation

The Draft 208 Plan calls for several steps as part of its recommendation including:

- ∞ Information (in the form of monitoring and water quality data)
- ∞ Regulatory Reform (including the creation of Targeted Plans and Watershed Permitting)
- ∞ Support (efforts to support ongoing planning efforts)
- ∞ Costs (creating new financial /funding sources)

Mashpee supports these efforts and has integrated these into its planning process.



3 Public Participation, Outreach, and Regional Coordination

3.1 Introduction

The Mashpee Sewer Commission has actively engaged in public participation and regional coordination throughout the planning process, with a focus on educating the public on the issues of wastewater and nutrients as they relate to the watersheds of Popponesset Bay and Waquoit Bay's east basin, in addition to the remaining portions of Mashpee within the Project Planning Area. The Commission has actively encouraged residents, Town leaders, business leaders, regulators, and adjacent communities within and outside of the planning area to actively participate in the planning process. The public outreach program consists of several components, including:

- ∞ Monthly Sewer Commission meetings—televised and open to the public.
- ∞ Community Advisory Committee (CAC).
- ∞ Public Presentations.
- ∞ Development of public education materials:
 - Project Web page: www.mashpeewaters.com
 - Project kiosk
 - Informational flier (first of two)—the second will be coordinated with the submittal of the Final Recommended Plan
- ∞ Participation in a formal MEPA/Cape Cod Commission environmental review process.
- ∞ Participation in several “Pilot” projects supported by Barnstable County and other regional agencies.
- ∞ Joint meetings with Barnstable, Falmouth, and Sandwich.

The project's regional coordination efforts, in addition to the meetings and CAC listed above, include the initial drafting of an MOU between the communities (specifically regarding Popponesset Bay) with the intent of that being a model for Waquoit Bay and a model for other communities to consider as well.

3.2 Mashpee Sewer Commission

The Town of Mashpee formed the Mashpee Sewer Commission in 1987 which is the lead in the planning efforts for this project. Formed under provision of Massachusetts General Law (M.G.L.), the Commission was empowered to build, maintain, and operate sewers and wastewater treatment facilities, and to assess betterments and sewer-use charges to fund sewer construction and operation. The Commission has transformed over the 14 years of this project, starting as a group of three (3) elected members, and then becoming a seven (7) member body appointed by the Mashpee Selectmen on which the following five (5) members serve (two vacancies):

- ∞ F. Thomas Fudala—Chairman
- ∞ Joseph N. Lyons—Vice-Chairman
- ∞ Mark N. Gurnee—Clerk
- ∞ Thomas F. Burns



- ∞ L. Glenn Santos

The Commission has also had an administrator since 2012, Paul Gobell, P.E. who works with the Commission and GHD.

The Sewer Commission has been meeting on a monthly basis regarding the WNMP since 2001, reviewing project information, presenting project related information and findings from MEP, Massachusetts Department of Environmental Protection, United States Geological Survey (USGS), CCC, and other regional efforts related to wastewater and nutrient management issues. As part of their regular meetings, the Commission also solicits input from the CAC, residents, and neighboring communities.

3.3 Community Advisory Committee

The Community Advisory Committee (CAC) is made up of a diverse group of representatives. It includes representatives from:

- ∞ The Mashpee Board of Health
- ∞ Mashpee Wampanoag Indian Tribal Council (currently vacant)
- ∞ Mashpee Conservation Commission
- ∞ Mashpee Chamber of Commerce
- ∞ Mashpee Historical Commission
- ∞ Mashpee Environmental Coalition
- ∞ Mashpee Shellfish Commission
- ∞ Mashpee Waterways Commission
- ∞ Mashpee Precinct Representatives (five appointed by the Board of Selectmen)
- ∞ Town of Barnstable Representatives
- ∞ Town of Falmouth Representatives
- ∞ Town of Sandwich Representatives

All members are invited to each meeting and copied on major correspondence including reports; however, attendance and representation has been limited likely due to the extended nature of this project. This project predated the MEP work and therefore a lengthy delay was incurred as the project awaited the results of this work and the finalized TMDLs. In addition, several of the adjacent communities are involved in their own concurrent planning projects.

3.4 Public Outreach and Materials

The Sewer Commission as part of this project has worked with GHD and Regina Villa Associates (RVA) of Boston to develop several public outreach items including:

- ∞ 2011: A tabletop display/kiosk that presented “What’s the Problem”, discussing what the project was about and a map of the planning area. A copy of this is located in Appendix 3-1.
- ∞ 2011: An informational Web page where people can find out about the project, the problem, meetings and news, documents and resources, and contact information. The Web page can be found at: <http://www.mashpeewaters.com/index.html> and screen shots of several of the pages are included in Appendix 3-1.
- ∞ 2013: Sewer Commission booth at “Octoberfest” held October 12th in Mashpee.



- ∞ 2013: Sewer Commission booth at October Town Meeting.
- ∞ 2013: An informational flier reminding the public of the issues related to wastewater and nutrients, their impacts on the Town, and what the Town is working on to address these issues. A copy of this flier is located in Appendix 3-1.

The Commission will also create a second flier outlining the recommendations of the Final WNMP/CWMP/Draft Environmental Impact Report.

3.5 Public Presentations

Throughout the course of the project there have been several presentations made and the following is a sample of those:

- ∞ Sewer Commission meeting presentations:
 - 2005 presentation on “Sewer System and Groundwater Modeling Evaluations”
 - 2007 presentation on the “Final Needs Assessment Report”
 - 2008 presentation on the “Final Technology Screening Report”
 - 2011 presentations on modeling scenarios
 - 2012 presentation on the Project progress and next steps
 - 2013 presentation on “Alternative Screening Analysis”
 - 2014 presentation on “Draft Recommended Plan/Draft Environmental Impact Report”
- ∞ Presentations to other groups:
 - 2006 “Popponesset Bay Pilot Project”, presented by Tom Fudala
 - 2007 “WNMP Introduction and Status to Sandwich Water Quality Advisory Committee”
 - 2013 “Mashpee Next Steps presented to Falmouth Water Quality Management Committee”
 - 2013 “Mashpee Next Steps presented to Barnstable CAC”
 - 2013 “Presentation to Cape Wastewater Planning Workshop”
 - 2014 MEPA/CCC Joint Public Hearing on Draft Recommended Plan/Draft Environmental Impact Report

In addition there were several presentations by the Popponesset Bay Pilot Project group, MEP, CCC and Cape Cod Water Quality Collaborative, USGS on particle tracking and groundwater modeling, and equipment suppliers related to various collection system technologies.

3.6 Coordination and Outreach to Neighboring Towns and Joint Base Cape Cod

Throughout the course of the project there have been several regional meetings both directly related to this project and those meetings generated by regional efforts. Several of these meetings with adjacent communities have been identified above. In addition, the Sewer Commission and the Town have actively participated in the following:

- ∞ Participation in the Town of Barnstable CAC.



- ∞ Joint meetings of Falmouth Water Quality Management Committee (WQMC) with Mashpee Sewer Commission (in Mashpee).
- ∞ Attendance at Falmouth WQMC Meetings.
- ∞ Participation at Cape Cod 208 Planning Meetings.

Mashpee has been actively coordinating with MassDevelopment, who is working with Joint Base Cape Cod and their consultant to determine how the future use of the wastewater treatment facility at the base will be managed and operated. As of January 2015, correspondence with MassDevelopment indicated that they will convey Mashpee's continued interest to the leadership group who are evaluating the decision on the Base and they will keep the Town informed of their decision on the future of the facility once they have completed their evaluation.

As part of the MassDEP Pilot Project and a program through the Cape Cod Commission and the County's Water Protection Collaborative, Mashpee and its neighbors have also developed a draft Memorandum of Understanding for Popponesset Bay. This has been reviewed by the Town of Barnstable with a favorable response from the Citizens Advisory Committee and is discussed in the following section.

3.7 Popponesset Bay Memorandum of Understanding (MOU)

A draft "Inter-municipal Agreement (IMA) for Development and Implementation of a Regional, Watershed Based Wastewater Management Plan for the Popponesset Bay Watershed" has been developed and circulated between Barnstable, Mashpee, and Sandwich.

The proposed IMA has its origins in the DEP Pilot Project, funded by the Environmental Protection Agency (EPA), formally titled "Inter-municipal Watershed Planning and TMDL Implementation to Restore Embayment Water Quality on Cape Cod". The final report's Executive Summary states that the goal of this project "was to report the decision making process that engaged the attention community leaders for the load reductions the towns would collectively share for restoring estuarine water and habitat quality for compliance with the federal Clean Water Act Total Maximum Daily Load (TMDL). This project engaged the stakeholders (municipal, county, state, and environmental organizations) within the Popponesset Bay (Mashpee, Barnstable, and Sandwich, MA), Three Bays (Barnstable, Sandwich, and Mashpee, MA), and Pleasant Bay watersheds (Chatham, Orleans, Brewster, and Harwich, MA)." The working group for the Popponesset estuary, involving representatives of Barnstable, Mashpee, and Sandwich, worked on the project from 2003 to 2008, facilitated by DEP and supported by UMass-Dartmouth SMAST under the Massachusetts Estuaries Program. Results of the MEP and resulting DEP TMDL reports for the Popponesset Bay watershed were utilized to develop a methodology for allocating each town's attenuated and unattenuated nitrogen loads to the estuary, along with a "fair share" allocation of responsibility for reducing each town's nitrogen load to meet the TMDL. The methodology was based on an equal reduction of each town's 2001 loads (per the MEP report) to a level that met the TMDL. Per SMAST, the required reduction was 49.2% of the attenuated load reaching the Bay. The remaining load, after reduction, or 50.8% of 2001 loads, was each town's permanent "fair share" of allowed nitrogen loading to the estuary. Aside from discussions within the working group, the methodology and town shares were presented to the Sandwich Water Quality Advisory Committee and the Barnstable Citizens Advisory Committee for Wastewater Planning in 2007 by representatives from Mashpee and GHD. Additional meetings, particularly with Barnstable, have been held since then.